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The effect of education on women's propensity to be childless in Spain: Does the field of education matter?

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Abstract

This article investigates the relationship between educational attainment, in terms of both level and field of education, and the probability of being childless in Spain. Findings demonstrate that there is a significant difference in childlessness by education level among women aged 34-50, while this significance disappears when the analysis is not confined to older women but includes all women (aged 18-50) and is controlled for heterogeneity. In this latter case, childlessness has more to do with later childbearing among young women than with the accumulation of human capital. However, women educated in those studies concerned with the care of individuals and/or emphasizing interpersonal skills have a lower probability of being childless than women in other fields of study, irrespective of their education level, in both samples.

In addition, the results show that childlessness, departure from education and union formation are jointly determined. Young women who want to be childfree or end up being childless stay in school for a longer period of time and postpone their union formation, whilst those with strong family/fertility intentions accelerate the three processes. I use data from the Spanish Family and Fertility Survey (1995) and apply event history models that take into account unobserved heterogeneity.

1. Introduction

The last decades of the twentieth century and the early twenty-first century have witnessed important transformations in women's reproductive careers. In all Western societies, there has been a pronounced trend towards a progressive postponement of major family events with a decrease in fertility levels, in most cases below replacement (Billari et al., 2006). For instance, in Spain in 2005 the mean age at first marriage and motherhood was 29.3 and 30.9 respectively for women, well above the EU-25 average. With a stable 1.2/1.3 over the past fifteen years, Spain was also one of the first countries to reach levels of "lowest-low" fertility (Kohler et al., 2002). In parallel, there has been

a notable growth in female education levels and in female labour participation in Spain from the 1970s until now. Access to university was extended to the emergent middle classes and the proportion of women with secondary level schooling and with a degree has even surpassed that of men. In addition, at present 77.2 percent of Spanish women aged 25-34 participate in the labour market, slightly above the EU-25 average for this age group (75.7 percent) (Eurostat, 2008).

A substantial component of the low national overall fertility levels is due to childlessness among the youngest cohorts across countries. In most Western societies, childlessness has increased since the 1945 birth cohort (Devolder, 2005). Recent studies have demonstrated that, although the majority of women continue to become mothers at some point in their lives, increasing proportions of women choose to remain childless due to both reproductive choice and greater autonomy in ways not possible for previous generations (Gillispie, 2003: 133), or they end up being childless because they perpetually postpone having the first birth.[1] Postponement displaces a female's reproductive span of reduced fecundability, increasing sterility and the risk of miscarriage. Research has also found that both groups of childless women tend to accumulate a high level of human capital in education or career-building paths (McAllister and Clarke, 1998). Worldwide, there is a strong link between childlessness and higher education across cohorts (Rosero-Bixby et al., 2009).

True, the increasing levels of educational attainment and labour participation among the youngest female generations are frequently used by the defenders of the economic

[1] Postponers constitute the largest single group in most analyses about childlessness (Heaton et al., 1999). Toulemon speaks about "a most restrictive" and "a broadest" definition of "voluntary childlessness" to refer to the case of women/couples who have always wanted to remain childless and all women/couples who have never had a child even if they have contemplated having one in the future (Toulemon, 1996:12-13).

theory of the family as main factors in the rise in delayed marriages, the decline in fertility and the emergence of childfree lifestyles. However, a study based on Sweden has recently shown that the positive association between education and permanent childlessness is not very strong and the differences in childlessness by level of education diminish over the life course (Hoem et al., 2006). The authors, however, demonstrate that there are important differences in permanent childlessness by type of education. In fact, the field of education is shown to be more important than the education level in Sweden. Swedish women educated in teaching and health care show a lower probability of remaining childless at each education level than any other women. Lappegard and Ronsen (2005) have shown similar results in Norway. Going one step further, Neyer and Hoem (2008) have explored the question of whether these patterns of childlessness are unique to the Scandinavian institutional context or whether they also apply in Austria, a country with a different education system, labour-market structure and type of welfare state. They found that for most groups permanent childlessness is higher in Austria, and for graduates it is much higher. However, women educated in teaching and health care also have lower childlessness than other fields of education.

At an individual level, then, is the picture for women in Spain different to that presented above regarding the subject of a woman who has studied and the effect of this on childlessness? The inclusion of the field of study has proved to be both theoretically and empirically relevant for women's transition to first, second and third birth in Spain (Martín-García, 2008, Martín-García and Baizán, 2006).[2] However, to the best of my knowledge, no study has been undertaken to investigate the role of the line of education

[2] For men, type of education is shown to be just as important as level of education. However, the mechanism linking men's line of education to their probability of becoming parents is quite the opposite to women's: those academic fields concerned with caring and/or which emphasize interpersonal skills do not have a positive impact on men's first birth timing in Spain (Martín-García, 2009).

on childlessness in Spain. In order to fill this gap, the following specific research questions were posed. First, do highly educated women in Spain have the same level of childlessness as less educated women over the life course, that is, at different stages of their reproductive careers? Second, are there differences among women at each education level regarding childlessness due to their field of education? This article seeks to go beyond human capital explanations by providing a broader account of the meanings and significance of choosing certain fields of study to the women themselves. Although childless women constitute a very heterogeneous group, my aim is to examine how far educational gender segregation (and particularly the selection of typical female fields of study) affects childlessness in Spain.

This paper is structured as follows. Section 2 reviews theories and empirical findings connected to the effect of education on childlessness and discusses why a woman's field of study may be an additional explanatory factor in explaining her fertility behaviour. It also presents the main hypotheses used in the analysis. I describe the data and the methods in Section 3. The results are presented and discussed in Section 4 and the conclusions are provided in the final section.

2. Education and childlessness in the life course of women. Why can field of education affect the propensity to be childless? The "type of education" hypothesis.

A wide range of research has shown that childlessness may be the outcome of different aspirations and conditions. Some un-partnered women may not want to become mothers alone. Others may delay motherhood too much and may end up having fecundity problems. Some women may freely decide not to become mothers while others may be constrained to make that choice in an institutional context where children are not easily

compatible with other tasks in women's lives. In this latter sense, there are some explanations in the literature that seem to be particularly relevant in explaining why women are unable to achieve their reproductive aims. First, the increasing prevalence of childlessness may be explained by the New Home Economics perspective. More education, better job opportunities and higher earnings for women increase the opportunity costs of having children and therefore reduce the demand for them (Becker, 1981, Gustafsson, 2001). Occupational responsibilities constrain women, highly educated women in particular, to adapt their personal life to their professional career and this problem of family and paid work conciliation may bring about the postponement/abandonment of family formation. Better-educated women also have more knowledge and resources to avoid motherhood before they are ready for it. Hence, we will expect highly educated women to have higher levels of childlessness due to higher opportunity costs (**"human capital hypothesis" (H_1)**).

However, research demonstrates that the positive effect of women's education on childlessness is more evident in traditional family systems with strict gender-specific divisions of labour and substantial institutional constraints (Hoem et al., 2006; Neyer and Hoem, 2008). In the Spanish institutional context, the widespread precariousness and uncertainty within the labour market on the one hand and the scarcity of mother-friendly policies, particularly day-care facilities, on the other, lead young women to perceive their lives as being more vulnerable and insecure. Consequently, they delay leaving the parental home and refrain from taking certain risks such as forming their own household, entering into a cohabiting union and/or embarking on motherhood (Baizán, 2001; Esping-Andersen et al., 2002).

A recent study has illustrated the idea that, at the micro level, most women need to meet a minimum set of conditions before embarking on motherhood. According to the authors, this set of conditions may include "job stability, a minimum income level, adequate housing and time flexibility, which again might be more or less feasible according to the institutional context" (González and Jurado-Guerrero, 2006: 323). In fact, they show that there is no clear relationship between human capital investments and childlessness for women aged 18-39. Irrespective of age and educational attainment, "women who are within the educational system or with unstable employment relations (fixed-term contracts, a recent employment relation or unemployment) have a low propensity to have a first child" (González and Jurado-Guerrero, 2006: 333). In the particular case of Spain, González and Jurado-Guerrero maintain that uncertainty partly explains the progressive postponement of motherhood and the eventual increase in unintended childlessness.

A second explanation for childlessness is provided by value and preference mechanisms. Some demographers consider this increasing phenomenon in Europe as being part of the so-called *second demographic transition* since "with increasing economic prosperity there has been a transition to post-materialism which can be characterized by substantial changes in attitudes to marriage, family and sexuality" (Van de Kaa, 1987, cit. in: Blossfeld, 1995: 7). Lesthaeghe and Moors (1995) have also developed a theoretical and empirical work that highlights value change as the main determining factor in changing behaviours related to family formation and fertility in Europe. In this sense, increased individualization and the emancipation of women are viewed as the driving forces that explain the new patterns of marriage formation, the

decline of births and the increasing proportion of childless women over recent decades (Alwin, 1996).

It is a well-stylized fact that conditions and preferences toward motherhood have changed over the past decades. Nowadays, younger women, particularly those with higher education, face a wider spectrum of choices in all spheres of life and have different aspirations with regard to marriage and family, work life, economic self-sufficiency and lifestyles than their mothers and grandmothers (Crimmins et al., 1991). However, in any given cultural and economic context, women constitute a heterogeneous group in assimilating these new attitudes and each woman displays her own fertility preferences. Hakim outlines three ideal types of women according to their preferences (Hakim, 2003). She argues that today few women are fully committed to the labour market in the same way as men are, giving priority to career over family life (only around 20 percent). A high proportion of these women, she says, will remain childless through choice. Women that are exclusively home-centred and maintain the traditional housewife role are also very much in a minority. Hence, she argues, most women are "adaptive" and maintain a dual-role, that is, choose to combine family with paid work.

As cited above, previous empirical evidence has successfully proved that women "choose" in the way that Hakim proposes, but they are also constrained in their choices.[3] The issue on how to conciliate motherhood and work is crucial and it seems appropriate to reconsider the general assumptions proposed by the microeconomic theory (education is only a means to accumulating human capital which can be used in

[3] The author herself admits that "some proportion of other working women will remain childless, through a combination of circumstances (*not only choices*) that leads them to prioritise job over motherhood" (Hakim, 2000: 6, 50). [The italics are mine].

the labour market) and Hakim's preference theory (childlessness is the outcome of a lifestyle choice that prioritizes self-fulfilment, careers and material wellbeing over family life). The question to be raised is: at the same education level, are women a uniform group with common career orientations and the same preference for children? The fact that women acquire greater quantities of human capital may not necessarily lead to childlessness. To put it another way, family-orientation and career-orientation are not necessarily opposites and the effect of women's education on childlessness may not be positive straightaway.

"One of the advantages of education is that it opens up new opportunities and allows the individual greater control over his/her own circumstances; autonomy does not necessarily mean curtailing women's reproductive behaviour but realizing their reproductive choices" (Hoem and Hoem, 1989: 64; Heaton et al., 1999). In fact, autonomy is shown to play a key role in determining preferences and explains the dynamics of family decisions. A recent study demonstrates that preferences vary across individuals with the same degree of autonomy and that taking personality features into account is crucial in explaining family decisions (Echávarri 2009). In this respect, lines of education may be an additional important explanatory variable for the fertility behaviour of women.

In this paper, I argue that although women's greater autonomy and higher social status are good explanations for childlessness, they do not fully explain why, at the same education level, a proportion of women choose to be childfree or end up being childless while others do not. Why do some highly educated women, and not others, reject/postpone motherhood? Choosing a specific type of education may be subject to

individual preferences about a desired lifestyle, in which women show a particular orientation towards family life and motherhood, irrespective of their educational attainment. In this sense, Coleman argues that "attitudes and values could be far more important than demographers have so far thought to explain fertility" (Coleman, 1996: 40).

Therefore, "a young women with strong family preferences may pursue education and even a career, but she is most likely to select herself into the kinds of studies and jobs that are most easily compatible with motherhood" (Esping-Andersen et al., 2007: 27). Research shows that "women are more likely than men to interrupt their work life in order to tend to their family's needs… the limited portability of some firm-specific skills makes such skills unattractive for women who plan to interrupt their career to raise a family" (Estévez-Abe, 2005: 190). A woman anticipating family roles is expected to avoid fields where the pace of technological change during her interruption after the birth of a child is rapid. She will also exclude those where the depreciation of skills and the advancement in the field over this interim are higher (for instance, in fields such as science and engineering).

Women educated in those academic studies concerned with caring and/or which emphasize interpersonal skills, traditionally viewed as feminine and with more favourable employment conditions later on in the labour market, may then present lower levels of childlessness than women in other fields of study at the same education level (**"type of education hypothesis" (H_2)**). These are women who, irrespective of their human capital accumulation, may see motherhood and mothering tasks as fulfilling. Having children may involve "specific activities associated with nurturing and caring, which hold appeal for them and find a place in their lives". However, women in other

more male-dominated categories may consider their identity and self-fulfilment “away from a mother-centred focus”. These women, especially those with higher levels of education, may abandon motherhood “in favour of a childfree lifestyle more focused on career and an enhanced financial position” (Gillispie, 2003: 133).

This may be due to the presence of a selection effect because childless women are bound to have higher accumulation of human capital and less positive attitudes towards family building (Barber et al., 2002; Lesthaeghe, 2002). Childlessness, departure from education and union formation may then be simultaneously driven by unmeasured common factors that are rooted in a personal lifestyle choice. A common view in the literature is that young women who attend school do not embark on motherhood due to the incompatibility between the youth role of being a student and the adult role associated with motherhood (Blossfeld and Huninik, 1991). Apart from human capital accumulation, abundant empirical evidence indeed determines that education has a positive effect on childlessness due to the simple fact that women are participating in the education system. This effect will be particularly strong in a national institutional context such as Spain where young students cannot count on support from the State, the opportunity costs are high and women are more likely to renounce education/employment for motherhood. Previous studies have also shown that childless women, in contrast to mothers, tend to marry late (Bloom and Febley, 1982; Kiernan, 1989). For instance, a recent study shows that in Italy, forming one’s first union late is perhaps the best single predictor of the chances of remaining childless, both voluntarily and involuntarily (Tanturri and Mencarini, 2008).

However, if the selection effect exists, childlessness does not only depend on when a woman leaves the education system or when she enters her first union. Women who according to their value orientation have less of a desire to have children will simultaneously prefer to invest more in education as an alternative strategy and enter into a union later. In this sense, it seems reasonable to propose that women who favour childlessness may be a select group that possesses characteristics that make them remain in higher education and delay union formation (**"common determinants hypothesis" (H_3)**). In fact, attitudes toward childlessness and union formation on the one hand and childlessness and exit from education on the other are supposed to be negative, especially in contexts with a strong family-work imbalance such as Spain. Yet, previous research has shown that young women who intend to enter into a union early also leave school early in Spain (Coppola, 2003). A positive correlation is then expected between both processes, that of union formation and that of time to the conclusion of education.

3. Data, variables and methods

Data and Variables

I use data from the retrospective Spanish Fertility and Family Survey (1995). This survey uses a monthly time scale and provides individual-level data on family dynamics (partnership, fertility) and education histories for the birth cohorts born between 1945 and 1977. The dependent variable is considered as not having entered into motherhood at the date of the interview. Unfortunately, with the FFS data I am not able to know whether having no children is voluntary or involuntary although it could be assumed that in Spain, as occurs in most countries, only a small proportion of women make an

early and clear decision to remain childless.[4] Neither am I able to see whether not having had a child at the time of the interview will be stable over time, that is, I cannot disregard the fact that some of these women will have children later on. In order to better grasp this issue, I follow a two-fold analysis. First, I take the whole sample of women (aged 18-50 at the time of the interview). Second, I only consider older women aged 34-50.[5] In the first case, the sample comprises of 3,993 women (38.37 percent remained childless at the date of the interview). In the latter, there are 1,930 female respondents and only 9.53 percent remained childfree at the interview date.

I assume that the 34-50 age-group agglutinates more permanent childlessness, that is, voluntarily childless women, but also perpetual postponers –women who repeatedly delay having a first birth, whatever the reason may be, and finally end up involuntarily childless. Undoubtedly some caution is required in the results presented here since previous research has shown that, when establishing how childless women aged 34 would eventually become mothers by the age of 45, projections consolidate descriptive evidence that late cohorts are postponing, as opposed to avoiding parenthood in the UK (Kneale and Joshi, 2008). However, previous research has also noted that in countries such as Spain, the proportion of childless women is high without significant voluntary childlessness. In these countries, women do not have children due to involuntary factors

[4] The distinction between voluntary and involuntary childlessness cannot be analyzed with a representative survey such as the FFS with no dynamic and updated information on birth intentions since the beginning of women's fecund life.

[5] Ideally, this second sample of women should be confined to those in the oldest reproductive age groups at the time of the interview, that is, over age 40 because these women are very unlikely to have a first child of their own in the future (in fact, research shows that 40 to 41 years is the mean age at which female fertility comes to an end and sterility starts (Te Velde & Pearson, 2002, cit. in: Beets, 2006: 5). However, the small size of the sample obliged me to lower that age in order to have a minimum number of cases. Moreover, considerable research shows that fertility drastically declines after the age of 35 (Leridon 2004, cit. in: Beets, 2006: 6; Lampic et al., 2006). Toulemon also showed that 20% of women who try to become pregnant at age 35 fail, in contrast to 12% at age 30, 8% at age 25 and 4% at age 20 (Toulemon, 1995). Abundant empirical evidence thus supports that there is a high risk of childlessness, particularly among highly educated women, after age 35 and this justifies the choice of women's age for my analyses.

such as the postponement of childbearing and changes in family types (Devolder, 2005). My analysis does not pretend to describe differentials and trends of permanent childlessness among women by education level, but to be a first attempt towards a direct measurement of the impact of education, both in terms of level and field, on the probability of being childless at different reproductive ages.

The main independent variable in this study is woman's education. The FFS supplies full histories of education enrolment that includes dates of attainment for each level of education. The education enrolment variable reflects whether the woman is in or outside of education. The woman's level of education is classified in three levels according to the ISCED system: primary and lower secondary education, upper secondary education and university education.[6] I also include the type of education for each education level in order to incorporate possible differences in childlessness among women at the same education level. Hoem, Neyer and Andersson argue that "women who are interested in social relationships and in other people should be more likely to opt for an education in which they can work closely with people, such as educations for teaching, health care, social work, anthropology, and so on. At the same time they may be more inclined to have children than women who are less interested in personal relationships and in other people" (Hoem et al., 2006: 340)

Thus, one branch of education studies includes those related to the care of individuals and studies which involve specific social skills or relational capacities. Such studies draw on characteristics that can be seen as an extension of traditional female and nurturing roles. All other studies are grouped together in another category, as they often

[6] International Standard Classification of Education 1997.

lead to occupations that are male-dominated, more career oriented and driven by high incomes, such as those in business, technical and/or professional occupations. In Table 1, I present in detail the classification of education types used in the analysis. Table 2 shows the distribution of female respondents by the level and field of study for both the whole sample and that of women aged 34 to 50.

A number of demographic and contextual control variables are also included in the process of childlessness to interpret these variables related to the woman's education. All the piecewise linear models applied include age as the baseline. Moreover, for the first analysis, which includes all women in the sample, I incorporate four birth cohorts: 1945-1954, 1955-1959, 1960-1964 and 1965-1977. For the second analysis, which only considers the group of women aged 34 to 50, two birth cohorts are used: 1945-1954 and 1955-1961. Models are also controlled by the place of residence up to age 15, the number of siblings and the woman's employment status. The fewer the number of siblings, the lesser women may desire children because they are used to small families. Therefore, women who have had a lower number of siblings will show a personal preference for smaller families with just one or no child at all. Regarding women's employment status, women are still the main child care providers. In a country such as Spain where the conflict family-career is viewed more strongly, I assume that the effect of the positive relationship between being employed and childlessness will be strong. The time-varying covariate partnership status indicates whether the woman is in a union or not.[7]

[7] No distinction is made between cohabitation and marriage although some selection effects may also operate here.

When studying union formation, observation begins at the age of 15 years and ends with the entry into a partnership or, for right-censored cases, with the date of the interview. I include the following variables: three fixed covariates (residence up to 15, birth cohort, number of siblings), and four time-varying covariates (education enrolment, education level, type of education for each education level and employment status). In the process of departing from the education system, the observation is censored when the woman had not left education at the time of the interview. The dependent variable is measured as being the first time the woman left the education system, after the age of 11, unless the woman interrupted education for less than 16 months. In the latter case, I took the subsequent date of leaving education. I include the following variables: two fixed covariates (residence up to age 15 and birth cohort) and four time-varying covariates (parental union disruption, employment situation, partnership and motherhood status). The variable 'motherhood status' reflects whether the woman is childless or whether she already has a child.

Methodology

The modelling approach used in this paper is event history analysis which continuously updates the relationship between women's education history on the one hand and their family history on the other. I initially use a standard specification with proportional hazard models for the processes of childlessness, departure from the education system and that of entering into a union, respectively. This can be represented mathematically in the following way:[8]

[8] In this exposition, I rely on similar models of cohabitation, marriage and first birth as presented in Baizán et al. (2003) for Spain and Baizán et al. (2004) for Sweden and Germany.

$$\ln h(t) = y(t) + \sum_j a_j x_j + \sum_i \alpha_i w_i(t) \quad (1)$$

where *y(t)* denotes a piecewise linear spline that captures the effect of the duration on the intensity. $\{x_j\}$ denotes fixed time-invariant covariates and $\{w_i(\cdot)\}$ are a set of time-varying covariates whose values change at discrete times in the spell and are constant over the time span between those changes (Baizán et al., 2003: 154-155).

However, as presented in Section 2, I suspect that the effect of the education biography on childlessness may be biased in the above specification, due to selection problems. Unmeasureable attributes may affect protracted education enrolment and family formation (entry into a union and fertility). Thus, I simultaneously run a joint model of education enrolment, union formation and childlessness following the general multi-process approach outlined by Lillard (1993). Women who continue to a higher education level might represent a select group also holding particular values and norms that favour delayed union formation and childlessness:

$$\begin{aligned} \ln h^{CH}(t) &= y^{CH}(t) + \sum_j b_j x_j + \sum_i \beta_i w_i(t) + \delta \\ \ln h^{U}(t) &= y^{U}(t) + \sum_j l_j x_j + \sum_i \lambda_i w_i(t) + \varepsilon \\ \ln h^{E}(t) &= y^{E}(t) + \sum_j p_j x_j + \sum_i \pi_i w_i(t) + \eta \end{aligned} \quad (2)$$

The superscripts *CH, U* and *E* denote childlessness, union formation and the end of education enrolment. Model (2) differs from the above-mentioned Model (1) by the joint estimation of the parameters of the equations and by the inclusion of the random variables δ, ε and η respectively. These heterogeneity components capture factors that

are unobserved and woman-specific. The measurement of the correlation between the heterogeneity components of each process ($\rho_{\delta\varepsilon}$, $\rho_{\delta\eta}$ and $\rho_{\varepsilon\eta}$) is a crucial test of the endogeneity between them.

4. Results

Findings are presented as follows: Table 3 outlines the analysis for childlessness, Table 4 documents union formation, Table 5 shows leaving the education system and Table 6 reports the correlation between the three processes. In order to analyze the three hypotheses included in the theoretical section, I have included four models: Models 1 and 2 do not include the unobserved heterogeneity components, while Models 3 and 4 do. Models 1 and 3 show the effect of the level of education alone and in Models 2 and 4 I have additionally included the type of education at each education level. In each Table, both the results for the whole sample of women aged 18-50 and those only for women aged 34-50 are displayed on the left and right side, respectively.

Effect of the level and type of education on childlessness

Data suggest that the Spanish pattern of childlessness by educational attainment is very similar to the one found by previous studies in other countries, with highly educated women having higher levels of childlessness than others with less education (Hoem et al., 2006; Neyer and Hoem, 2008). As for Austrian women, childlessness is higher in Spain for highly educated women than in Sweden. As previously reported, these differences may be attributable to institutional differences in Austria and Spain with respect to the Nordic countries which bring about a different culture of reproductive behaviour and different options in conciliation (Neyer and Hoem, 2008).

Results in Table 3 corroborate to some extent the **"human capital hypothesis" (H_1)** in both samples, although the monotonic negative relationship is stronger for women aged 34-50 (estimates of 0.93*** (upper secondary education) / 1.08*** (university) and 0.66*** / 0.84*** in Models 1 and 3 respectively vs. 0.27*** / 0.42*** and 0.12 and 0.15 for women aged 18-50 [reference group: primary/lower secondary education]). As shown, the effects are not significant and the difference between middle and better-educated women decreases when heterogeneity is controlled in the sample of all women. Longer periods in the education system and job uncertainty for a long period during youth is frequent in Spain and favours late life transitions in general, and motherhood in particular. As we will see later, for younger women the main issue is postponement, not renunciation, although postponement of motherhood increases the risk of childlessness.

In addition, the higher the women's level of education, the lower the levels of entry into a union in Models 1 and 3, without or with heterogeneity and for both samples of women (Table 4). All estimates are significant. Only in the case of women aged 34-50 when heterogeneity is not controlled, is the probability of being in a union the same for women either in the upper-secondary education group or in tertiary education, it being slightly higher for the former. All in all, better job opportunities for highly educated women seem to increase the opportunity costs of marriage and having children and therefore postpone union formation and increase the proportion of childless women in Spain. The education effect on partnership may also be related to the increasing mating problems of better-educated women reported previously for Spain (González and Jurado-Guerrero, 2006).

However, as presented in the theoretical section, the results shown above with regard to women's educational attainment should be complemented with the inclusion of the variable 'type of education'. Being better-educated increases the level of childlessness in comparison to middle-educated women with respect to the reference category but the inclusion of women's type of education qualifies this particular result (Models 2 and 4). When heterogeneity is not controlled, the estimate for being childless for a highly educated woman educated in the category *others* is 0.49*** and 1.32*** in both the sample of all women and that of women aged 34-50, respectively. In contrast, at the same level of education, there exists a weaker positive effect for women educated in the category *care and relational skills* (0.37*** and 0.99***). Corresponding figures for upper secondary educated women are as follows: 0.40*** and 1.26*** vs. 0.18 and 1.28***. Only in the latter case, is the predicted effect of the line of education in *care and relational skills* for women aged 34-50 not observed.

When the three processes are modelled simultaneously, important differences appear. The effect of the *care and relational skills* category of studies reverses and becomes negative although not significant for upper secondary women in the sample of all women (-0.06). Upper secondary women in the category *others* show a positive effect (0.18***). For highly educated women, the predicted difference between these lines of studies holds: 0.10 vs. 0.35*** in comparison to the reference category. The findings also corroborate the type of education hypothesis for women aged 34-50. Upper secondary educated women educated in *care and relational skills* do not differ with respect to primary educated women with regards to childlessness (1.01), whereas those in the category "others" do (1.09***). For highly educated women in the sample of

women aged 34-50, there is a significant difference between those educated in *care and relational skills* (0.74***) and those women in the category *others* (1.10**). As seen, once heterogeneity is controlled and the type of education is distinguished at each education level, the most highly educated women are not those with the highest level of childlessness. In fact, highly educated women educated for jobs in *care and relational skills* show lower levels of childlessness than any other education group in comparison to women with primary education (with the exception of upper secondary educated women in the category *general*).

This confirms our expectations that women can show a particular orientation towards family life and motherhood irrespective of their education and this is captured by their specific type of education **("type of education hypothesis" (H_2)**). These results challenge the New Home Economics approach and Hakim's assumption based on her preference theory, which presume childless women making a lifestyle choice: prioritising career, self-fulfilment and material wellbeing over family. Women in the *care and relational skills* category are probably a select group with high preferences for children, irrespective of their education and career orientation. In addition, the findings demonstrate that the Spanish pattern of childlessness by field of study is similar to the one shown in previous studies for Austria and Sweden, with women educated for teaching and health showing lower levels of childlessness than most others at each education level (Hoem et al., 2006; Neyer and Hoem, 2008).[9]

[9] Swedish and Austrian women educated for jobs in teaching and health care have much lower permanent childlessness at each education level than any other major education groupings. By contrast, women educated in arts and humanities or for religious occupations have unusually high percentages of permanently childless. These authors use register records containing fertility and education histories of about a quarter of a million women (an entire cohort of women born in 1955-59) which allowed them to operate with a high number of education field-and-level combinations in both countries (sixty in all). Unfortunately, this is not the case of the data at our disposal for Spain and women trained in the social sciences, art, theology and humanities have been included together with teaching and health care in a unique category under the label "care and relational skills" (see Table 1 for further details).

However, results do not support the 'type of education' hypothesis in explaining union formation and this implies a sharp contrast with regard to the above-mentioned effect of women's lines of education on childlessness. As cited above, over the last few decades there has been a lineal monotonic negative relationship between education and entry into union in Spain. Yet, results demonstrate that better-educated women educated in the category *care and relational skills* have higher levels of union formation in comparison to those educated in *others* studies only when we take the whole sample of women. In this case, the estimates are -0.29*** / -0.41*** and -0.97*** / -1.20*** for highly educated women in *care and relational skills* and *others*, respectively, in Models 2 and 4, without and with heterogeneity. These better educated women in the category *care and relational skills* who start a union and embark on motherhood later on are clearly highly family-oriented. However, the argument of the line of education does not apply for upper secondary educated women. Upper secondary educated women in the category *others* have a higher propensity to enter into a union in comparison to women in *care and social skills* with respect to the reference category (-0.24*** and -0.36*** vs. -0.31*** and -0.62*** in Models 2 and 4 respectively).

Nor does it apply for all groups of women, irrespective of their educational attainment, in the analysis of the sample of women aged 34-50. Two possible mechanisms may be at work here. First, there is a difference between women enrolled in degrees that are typically associated with lower pay and status such as humanities, education and nursing and women who choose more male-dominated fields of study that are linked to higher prestige and lead to better-paying jobs in the future. Women in the latter branch of studies may appear more attractive in the marriage market. Oppenheimer (1988,

1994) argues for instance that unions should occur after the young individual has ensured a secure position in the labour market so women with fewer chances for more resources and job security, that is, those in the category *care and relational skills*, are least likely to find suitable partners and this is why they show lower rates of union formation.[10]

Second, better-educated women in the *care and relational skills* category may end up occupying a substantial amount of posts in the public sector. The most common way to access these types of jobs in Spain is through various tests and examinations *(oposición)* and this fact means that it takes longer for these women to get established in the labour market. Women, particularly highly educated women, try to consolidate their careers before even thinking of entering into a union and women in the *care and relational skills* category seem to do this even more so. Data corroborate that upper secondary educated women aged 34-50 educated in *care and relational skills* have a lower probability of entering into a union (-0.34*** and -0.66*** in Models 2 and 4, without and with heterogeneity) in comparison to their counterparts in the category *others* (-0.22*** and -0.37***). Corresponding figures for highly educated women are as follows: -0.27*** and -1.07*** versus -0.11 and -0.89*.

Finally, the results of the influence of childlessness on departure from education (Table 5) show that a strong negative effect exists when the woman already has a child. Previous studies have demonstrated that the probability of ending education when the woman is pregnant is positive, while the impact is the opposite later on as shown here (Martín-García and Baizán, 2006). The woman does not necessarily leave the education

[10] Men with higher education levels and better socio-economic status are also more attractive in the marriage market (Oppenheimer, 1988).

system if she has not done so before the child is born. However, the low number of women involved in the calculation of this variable highlights the caution that is required in interpreting this particular result.

Interrelationship between childlessness, the timing of entering into a union and that of leaving education

With the FFS data, young women who participate in education show higher levels of childlessness. Results then support the findings in the literature that emphasise that women's investments in human capital definitely affect childlessness but the increasing participation in the education system itself also has an important effect on childlessness (Blossfeld and Huinink, 1991). The incompatibility between education and motherhood is more important than differentials between levels of education while the woman is still enrolled in school. In fact, there is a positive significant effect of being enrolled when explaining childlessness in the whole sample of women: 0.19*** and 0.28*** in Models 1 and 2. The fact that almost 40 percent of these women are childless at the date of the interview implies that childlessness may have a lot to do with postponement of childbearing here and we cannot disregard the fact that some of these women will have children later on when they are out of school. The literature has indeed shown that differentiated treatment of these two effects (enrolment and actual attained level) is crucial in exploring childlessness, especially when younger cohorts are also included in the analysis.

When we only take the sample of women aged 34-50, the positive effect of education enrolment becomes smaller and insignificant. In addition, once heterogeneity is controlled, the positive effect vanishes. As stated in Section 2, the third hypothesis

predicted an interconnection between childlessness, the timing of ending education and the entry into a union and results in Table 6 show that there is empirical support for this **"common determinants hypothesis (H_3)"**. The inclusion of the common unmeasured factors adds a complementary perspective to Models 1 and 2 with no heterogeneity (both models reflect the "gross" effect of education enrolment and education attainment) and allows us to distinguish the causal vs. the spurious effect of education on childlessness. Otherwise, better-educated and un-partnered women will be over-represented in the sample of childless women and results will be biased.

In fact, we see that for the whole sample of women, there is a strong and significant negative correlation between the heterogeneity components of the process of childlessness and union formation (-0.51*** and -0.80*** in Models 3 and 4 respectively) and between those of the process of childlessness and departure from education (-0.48*** and -0.44***). Additionally, we observe a positive correlation between the heterogeneity components of the processes of departure from education and union formation (0.22*** and 0.21***). Corresponding figures in the analysis with the sample of women aged 34-50 are as follows: -0.85*** and -0.85***; -0.42*** and -0.42***; and -0.16*** and 0.16***. This implies that women who want to be or end up being childless are most likely to leave school and to enter into a union later.

The introduction of a correlation between the common unmeasured factors (e.g. norms, values, infecundity, etc.) of the processes of childlessness, departure from education and union formation also have a considerable impact on the estimated effects of the other covariates. For instance, there is a greater impact of the birth-cohort, residence up to the age of 15, education level, education type and employment status in models with

heterogeneity. For women in both samples, there is a strong positive impact on childlessness for younger generations. Research has often shown that more favourable attitudes toward childlessness, but also less traditional family patterns, are more common among younger as compared to older cohorts. Data demonstrate that for the 1965-1977 birth cohort this positive effect is much stronger when heterogeneity is controlled. Results also show that growing up in a family with a relatively high number of siblings does not influence childlessness when heterogeneity is controlled. An only child is shown to have lower levels of childlessness but the effect is not significant neither in the whole sample nor in the sample of women aged 34-50.

Moreover, women in urban areas have higher levels of childlessness although the effect is only significant for the whole sample of women. The partner variable shows a strong negative effect on childlessness, particularly for the sample of women aged 34-50 (estimates of -2.56***, -2.58***, -1.81***, -1.81*** in Models 1 to 4, respectively). Being single is often viewed as a barrier to having the first child and this is particularly so in a still traditional context such as Spain where most childbearing still occurs in a committed relationship. In addition, the variable 'partner' has an important effect on the intention or the propensity to be childless but it also affects whether a woman is enrolled in education, particularly in the whole sample of women aged 18-50. In fact, the impact of education enrolment on childlessness is greater when the variable 'partner' is not included (results not shown here).

Finally, Table 4 shows that women's employment situation appears not to be that relevant in explaining childlessness. For the whole sample of women, the effect is slightly negative but not significant. For women aged 34-50, it is positive although not

significant if partnership is included in the models.[11] A recent study on Italy has also shown that the significant effect does not depend on whether the woman is employed or not, but mainly on her type of position and work schedule in the first period of her union life (Tanturri and Mencarini, 2008). This is a remaining task for future research. In addition, when the three processes are modelled simultaneously, the positive effect of the woman's education enrolment on childlessness disappears and even becomes negative although not significant in Models 3 and 4. Once again, the low number of individuals involved in this covariate, particularly when we take only the sample of women aged 34-50 (the vast majority of women are out of the education system by that age), requires caution in the interpretation of this particular result.

5. Conclusions

Postponing childbearing seems to be a suitable strategy that allows women to achieve a high degree of education, establish themselves in the labour market, stabilize their relationships before childrearing and deal with unstable life conditions and uncertainty in the Spanish economic context. Broadly speaking, later means fewer but a voluntary postponement of childbearing may also lead to no children at all for many of those who merely intended to postpone it and inevitably end up involuntarily childless.[12] Applying

[11] Without including the covariate "partner" in the analysis, the effect of being employed on childlessness is: 0.16***, 0.15***, -0.01, and -0.03 in Models 1, 2, 3 and 4, respectively, for the whole sample of women and 0.58***, 0.60***, 0.54** and 0.65*** for women aged 34-50. The stronger positive effect of women's education enrolment and employment status when the partnership status is not included shows that, more often than not, there is conflict between women's human capital investments and their role as mothers. As shown, this effect weakens/vanishes when "being in a union" is incorporated into the models.

[12] In this sense, Laurent Toulemon argues in her study on childlessness in France that women/couples "should be fully aware of the biological risks of postponing motherhood and that they should not exaggerate the possibilities of adoption and medically assisted procreation." (Toulemon, 1996: 25) In the same line of reasoning, Lampic et al. alerts us to the fact that women and men are seldom aware of the age-related decline in female fertility when in their late 30s due to childbirth postponement. According to the authors, the risk of involuntary infertility, especially among groups with higher education, is alarming in view of the great importance this group also puts on parenthood. "While couples who experience difficulties achieving pregnancy can turn to assisted reproduction techniques, these compensate for only

event history models to data from the Spanish Fertility Survey, this paper has tried to provide an answer to the specific research question of whether all women postpone/forgo motherhood as a result of their increasing educational attainment or whether there are intra-women differences with regard to childlessness according to the field of study they choose. The aim of the paper was then to investigate how gender specific distribution across lines of education leads to women's differences in childlessness in Spain.

The results can be summarized as follows. First, they partly confirm the human capital approach that predicts that women's increasing education postpones and reduces motherhood: the higher the woman's education attainment, the higher the level of childlessness. However, models that focus exclusively on women's increasing autonomy and level of education fall short of explaining why only a proportion of women choose to be childfree or end up being childless when reproductive options and education levels have increased for all. The findings in this paper demonstrate that women's type of education serves as a better indicator of female reproductive behaviour than their mere educational attainment. On the one hand, a woman's field of study reflects individual values and preferences concerning feminine identity, motherhood and mothering activities. On the other, it captures better family-friendly occupational work-life strategies. Undoubtedly, the fact that the differences within each type of education are of the same weight as those between different levels of education introduces an important dimension into the traditional analysis of childlessness.

half of all births lost by postponing a first attempt to conceive from age 30 to age 35." (Lampic et al., 2006: 559)

The emphasis on attitudes/values relevant to the family does not imply that they alone completely determine women's demographic behaviour. As mentioned repeatedly, other objective factors such as opportunities and constraints related to human capital accumulation may also play an important role but these cultural influences are shown to explain childlessness in a significant way. Hence, theories are more complementary rather than mutually exclusive and in order to get a more complete picture of the connection between education and childlessness, studies should take into account the different lines of education. Once these fields of study are distinguished, data show that higher education *per se* does not result in higher childlessness, that is, highly educated women are not those who always choose to be/are more childless. Better-educated women educated in the *care and relational skills* category show lower levels of childlessness with respect to those in the *others* category at the same education level and even with regards middle-educated women. In fact, this is one of the groups of women with the lowest propensity towards childlessness in Spain, irrespective of women's age.

That said, we have to bear in mind that empirical results shown here should be taken with caution due to the fact that they rely on data from women aged 41-50 but also from a relatively young birth cohort (women born between 1955-61, aged 34-40 in 1995). A larger dataset is needed for the estimation of the causal effects between education, field of study and permanent childlessness at the very end of women's reproductive careers (with women aged at least 40+ years). With the data at our disposal, it is not possible to offer concluding results of whether the increase in childlessness among young women that we observe reflects mainly a shift towards later childbearing or whether it may signal a definite retreat from childbearing. Additionally, the results are not controlled

for other relevant socio-economic variables such as job stability and income which, according to previous studies, influence the exit from childlessness (González and Jurado-Guerrero, 2006). In this sense, the issue of the effect of not only women's field of study but also of their type of occupation on the propensity to be childless remains open for future research. Finally, it would also be interesting to further analyze childlessness as the result of joint negotiations, whether direct or indirect, between both members of the couple (including each partner's level and field of education).

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TABLE 1: **Type of education (for each education level).**

	PRIMARY/LOWER SECONDARY EDUCATION	UPPER SECONDARY	TERTIARY EDUCATION
GENERAL STUDIES	General Primary/Lower Secondary Education (1)	General Upper Education (1/2)	
STUDIES RELATED TO THE CARE OF INDIVIDUALS OR INVOLVING SOCIAL SKILLS OR RELATIONAL CAPACITIES		Teacher training and education sciences; medicine and health; fine and applied arts; humanities; religion and theology; social and behavioural science; law and jurisprudence; home economics (domestic science) programs (3)	Teacher training and education sciences; medicine and health; fine and applied arts; humanities; religion and theology; social and behavioural sciences; law and jurisprudence (5)
OTHER STUDIES		Natural sciences; commerce and business administration; mathematics and computer science; trade, craft and industrial; engineering; architecture and town-planning; agriculture, forestry and fishery; service trade; transport and communication; mass communication and other programs (4)	Natural sciences; commerce and business administration; mathematics and computer sciences; engineering; architecture; mass communication; service trade; transport and communication; agriculture; forestry, fishery and other programs (6)

(1) *Primary and Low. Sec.: General*, in TABLES 3&4. (2) *Upper Sec: General*, in TABLES 3&4. (3) *Upper Sec: Care & Relational Skills*, in TABLES 3&4. (4) *Upper Sec: Others*, in TABLES 3&4. (5) *Tertiary: Care & Relational Skills*, in TABLES 3&4. (6) *Tertiary: Others*, in TABLES 3&4.

TABLE 2: **Distribution of respondents by the level and field of study ***

TYPE OF EDUCATION FOR EACH EDUCATION LEVEL**	ALL WOMEN INCLUDED, AGE 18-50					ONLY WOMEN AGED 34-50		
	1944-54	1955-59	1960-64	1965-77		194-54	1955-61	
Primary / Low Sec: General	**639** [31.64%][1] [76.61%][2]	**409** [20.25%] [61.96%]	**355** [17.58%] [47.84 %]	**616** [30.51%] [35.05%]	2019	**639** [50.55%][1] [76.61%][2]	**625** [49.45%] [57.02%]	1264
Upper Sec: General	**33** [13.25%] [3.95%]	**37** [14.85%] [5.60%]	**43** [17.26%] [5.79%]	**136** [54.61%] [7.74%]	249	**33** [33.67%] [3.95%]	**65** [62.33 %] [5.93 %]	98
Upper Sec: Care & Relational Skills	**25** [7.46%] [2.99%]	**45** [13.43%] [6.81%]	**59** [17.61%] [7.95%]	**206** [61.49%] [11.72%]	335	**25** [23.14%] [2.99%]	**83** [76.86%] [7.57%]	108
Upper Sec: Others	**77** [8.71%] [9.23%]	**72** [8.14%] [10.90 %]	**146** [16.51%] [19.67%]	**589** [66.62%] [33.52%]	884	**77** [24.27%] [9.23%]	**149** [75.73%] [13.59%]	226
Tertiary: Care & Relational Skills	**42** [12.53%] [5.03%]	**73** [21.79%] [11.06%]	**102** [30.44%] [13.74 %]	**118** [35.22%] [6.71%]	335	**42** [24.27 %] [5.03%]	**131** [75.73%] [11.95%]	173
Tertiary: Others	**18** [10.52%] [2.15%]	**24** [14.03%] [3.63%]	**37** [21.63%] [4.98%]	**92** [53.80%] [5.23%]	171	**18** [29.50 %] [2.15%]	**43** [70.50%] [3.92%]	61
	834	660	742	1757	**3993**	834	1096	**1930**

* Type of education of the highest level of education attained by the woman at the time of the interview. ** See TABLE 1.
[1] Percentage of women within each education level. [2] Percentage of women within each cohort.

TABLE 3: **Estimates of piecewise linear hazard models of BEING CHILDLESS**

	ALL WOMEN INCLUDED, AGE 18-50				**ONLY WOMEN AGED 34-50**			
	No heterogeneity		With heterogeneity		No heterogeneity		With heterogeneity	
Parameters	MOD.1	MOD.2	MOD.3	MOD.4	MOD.1	MOD.2	MOD.3	MOD.4
Baseline constant	-13.01***	-12.96***	-16.04***	-23.86***				
Age 15–22 (slope)	0.39***	0.39***	0.47***	0.99***				
Age 23–28 (slope)	0.13***	0.12***	0.21***	0.14***				
Age 29–33 (slope)	0.85***	0.84***	0.96***	0.89***				
Age 34–39 (slope)	0.60***	0.60***	0.70***	1.21***				
Age 40+	0.28***	0.28***	0.35***	0.33***				
BIRTH COHORTS								
1945 – 1954	-2.77***	-2.81***	-3.24***	-3.28***				
1955 – 1959 [ref.]								
1960 – 1964	3.79***	3.78***	4.55***	7.37***				
1965 – 1977	8.14***	8.10***	10.56***	14.95***				
Baseline constant					-6.08***	-6.32***	-8.37***	-8.81***
Age 34–36 (slope)					-0.31***	-0.29***	-0.17	-0.15
Age 37–40 (slope)					0.52***	0.55***	0.54***	0.59***
Age 41–43 (slope)					0.77***	0.78***	0.92***	0.93***
Age 44+ (slope)					0.07	0.07	0.14*	0.14*
BIRTH COHORTS								
1945 – 1954 [ref.]								
1955 – 1961					3.78***	3.96***	4.46***	4.72***
NUMER OF SIBLINGS								
No siblings	-0.11	-0.10	-0.10	-0.01	-0.51	-0.45	-0.29	-0.19
1 – 2 [ref.]								
3+	-0.22***	-0.22***	0.17***	0.15***	0.05	0.04	0.15	0.14

RESIDENCE UP TO 15								
Urban (10,000 – 1,000,000+	0.10*	0.10*	0.22***	0.14**	0.23	0.29	0.23	0.24
Rural (<9,999) [ref.]								
EDUCATION ENROLMENT [a]								
In education	0.19***	0.28***	-0.10	-0.01	0.12	0.15	-0.13	-0.08
Out of education [ref.]								
EDUCATION LEVEL [a]								
Primary / Lower Secondary [ref.]								
Upper Secondary	0.27***		0.12		0.93***		0.66***	
University	0.42***		0.15		1.08***		0.84***	
FIELD-OF-STUDY AT EACH EDUCATION LEVEL [a/b]								
Primary / Lower Sec: General [ref.]								
Upper Sec: General		0.08		0.01		0.35		-0.04
Upper Sec: Care & Relational Skills		0.18		-0.06		1.28***		1.01
Upper Sec: Others		0.40***		0.18**		1.26***		1.09***
University: Care & Relational Skills		0.37***		0.10		0.99***		0.74***
University: Others		0.49***		0.35***		1.32***		1.10**
EMPLOYMENT STATUS [a]								
Employed	-0.03	-0.05	0.04	-0.03	0.08	0.11	0.08	0.19
Not employed [ref.]								
PARTNERSHIP [a]								
In union	-1.56***	-1.57***	-1.18***	-0.49	-2.56***	-2.58***	-1.81***	-1.81***
Not in union [ref.]								
Log-likelihood	-43411.48	-43399.86	-43055.95	-43033.54	-20699.49	-20692.80	-20459.31	-20450.31

Significance levels: *** P<0.01, ** P<0.05, * P<0.10. [a] Time varying covariates; [b] See Table 1.
Time periods from age 15 to 22; from 23 to 28; from 29 to 33; from 34 to 39; and then at open intervals for the whole sample of women (age 18-50). For women aged 34-50, time periods from age 34 to 36; from 37 to 40; from 41 to 43; and then at open intervals.

TABLE 4: **Estimates of piecewise linear hazard models of UNION FORMATION**

	ALL WOMEN INCLUDED, AGE 18-50				**ONLY WOMEN AGED 34-50**			
	No heterogeneity		With heterogeneity		No heterogeneity		With heterogeneity	
Parameters	MOD.1	MOD.2	MOD.3	MOD.4	MOD.1	MOD.2	MOD.3	MOD.4
Baseline constant	-4.33***	-4.33***	-7.09***	-5.79***	-5.04***	-5.04***	-9.22***	-9.32***
Age 15–20 (slope)	0.53***	0.53***	1.02***	0.81***	0.63***	0.63***	1.22***	1.24***
Age 21–24 (slope)	0.20***	0.20***	0.70***	0.52***	0.23***	0.23***	0.91***	0.91***
Age 25–27 (slope)	0.01	0.01	0.49***	0.31***	-0.04	-0.04	0.51***	0.52***
Age 28–32 (slope)	-0.16***	-0.16***	0.11***	0.04	-0.12***	-0.12***	0.17***	0.17***
Age 33+	-0.16***	-0.16***	-0.11**	-0.12***	-0.17***	-0.17***	-0.14***	-0.13***
BIRTH COHORTS								
1945 – 1954	-0.28***	-0.28***	-0.79***	-0.69***				
1955 – 1959 [ref.]								
1960 – 1964	-0.10*	-0.10*	-0.26*	-0.34***				
1965 – 1977	-0.35***	-0.36***	-1.28***	-1.26***				
BIRTH COHORTS								
1945 – 1954 [ref.]								
1955 – 1961					0.20***	0.21***	0.66***	0.68***
NUMER OF SIBLINGS								
No siblings	0.05	0.06	-0.07	-0.06	0.06	0.06	0.03	0.06
1 – 2 [ref.]								
3+	0.10***	0.10***	0.45***	0.23***	0.06	0.06	0.17	0.18**
RESIDENCE UP TO 15								
Urban (10,000 – 1,000,000+	0.08**	0.09**	0.06	0.15**	0.09**	0.09**	0.30**	0.34
Rural (<9,999) [ref.]								

EDUCATION ENROLMENT [a]								
In education	-1.36***	-1.30***	-1.48***	-1.29***	-1.08***	-1.07***	-1.40***	-1.32***
Out of education [ref.]								
EDUCATION LEVEL [a]								
Primary / Lower Secondary [ref.]								
Upper Secondary	-0.31***		-0.70***		-0.26***		-0.56***	
University	-0.32***		-1.26***		-0.24***		-0.96***	
FIELD-OF-STUDY AT EACH EDUCATION LEVEL [a/b]								
Primary / Lower Sec: General [ref.]								
Upper Sec: General		-0.42***		-0.83***		-0.27***		-0.76***
Upper Sec: Care & Relational Skills		-0.31***		-0.62***		-0.34**		-0.66**
Upper Sec: Others		-0.24***		-0.36***		-0.22***		-0.37*
University: Care & Relational Skills		-0.29***		-0.97***		-0.27***		-1.07***
University: Others		-0.41***		-1.20***		-0.11		-0.89*
EMPLOYMENT STATUS [a]								
Employed	-0.54***	-0.54***	-1.29***	-1.07***	-0.69***	-0.69***	-1.71***	-1.72***
Not employed [ref.]								
Log-likelihood	-43411.48	-43399.86	-43055.95	-43033.54	-20699.49	-20692.80	-20459.31	-20450.31

Significance levels: *** P<0.01, ** P<0.05, * P<0.10. [a] Time varying covariates; [b] See Table 1.
Time periods from age 15 to 20; from 21 to 24; from 25 to 27; from 28 to 32; and then at open intervals.

TABLE 5: **Estimates of piecewise linear hazard models of END OF EDUCATION**

	ALL WOMEN INCLUDED, AGE 18-50				**ONLY WOMEN AGED 34-50**			
	No heterogeneity		With heterogeneity		No heterogeneity		With heterogeneity	
Parameters	MOD.1	MOD.2	MOD.3	MOD.4	MOD.1	MOD.2	MOD.3	MOD.4
Baseline constant	-1.99***	-1.99***	-3.32***	-3.20***	-1.37***	-1.37***	-2.11***	-2.11***
Age 11–15 (slope)	0.03	0.03	0.49***	0.46***	-0.07***	-0.07***	0.34***	0.33***
Age 16–18 (slope)	0.10***	0.10***	0.33***	0.31***	0.01	0.01	0.13***	0.13***
Age 19–21 (slope)	-0.01	-0.01	0.20***	0.17***	0.03	0.03	0.23***	0.23***
Age 22–24 (slope)	0.02	0.02	0.29***	0.28***	-0.12**	-0.12**	0.04	0.04
Age 24+ (slope)	-0.02	-0.02	0.09***	0.08***	0.02*	0.02*	0.10***	0.10***
BIRTH COHORTS								
1945 – 1954	0.16***	0.16***	0.78***	0.67***				
1955 – 1959 [ref.]								
1960 – 1964	-0.19***	-0.19***	-0.63***	-0.69***				
1965 – 1977	-0.44***	-0.44***	-1.26***	-1.24***				
BIRTH COHORTS								
1945 – 1954 [ref.]								
1955 – 1961					-0.24***	-0.24***	-0.76***	-0.76***
RESIDENCE UP TO 15								
Urban (10,000 – 1,000,000+	-0.18***	-0.18***	-0.52***	-0.47***	-0.12***	-0.12***	-0.32***	-0.31***
Rural (<9,999) [ref.]								
NUMER OF SIBLINGS								
No siblings	-0.10	-0.10	-0.39**	-0.38**	-0.04	-0.05	-0.28	-0.28
1 – 2 [ref.]								
3+	0.20***	0.20***	0.69***	0.59***	0.09**	0.09**	0.35***	0.35***

EMPLOYMENT STATUS [a]								
Employed	0.10**	0.10**	0.42***	0.45***	0.08	0.08	0.42***	0.41***
Not employed [ref.]								
PARENTAL DISRUPTION [a]								
Divorced / Separated	0.21*	0.21*	0.31	0.37*	0.27	0.27	0.44	0.43
No disruption [ref.]								
MOTHERHOOD STATUS [a]								
Have a 1st child	-1.27***	-1.27***	-1.59***	-1.55***	-1.19***	-1.19***	-1.44***	-1.43***
No child [ref.]								
PARTNERSHIP [a]								
In union	0.38***	0.38***	0.30***	0.38***	0.32***	0.32***	0.31***	0.31***
Not in union [ref.]								
Log-likelihood	-43411.48	-43399.86	-43055.95	-43033.54	-20699.49	-20692.80	-20459.31	-20450.31

Significance levels: *** P<0.01, ** P<0.05, * P<0.10. [a] Time varying covariates; [b] See Table 1.
Time periods from age 11 to 15; from 16 to 18; from 19 to 21; from 22 to 24; and then at open intervals.

TABLE 6: **Correlation between remaining childless, union formation and end of education**

	ALL WOMEN INCLUDED, AGE 18-50		**ONLY WOMEN AGED 34-50**	
	MODEL 3 Estimate	MODEL 4 Estimate	MODEL 3 Estimate	MODEL 4 Estimate
STANDARD DEVIATION OF δ	1.20***	2.93***	1.40***	1.45***
STANDARD DEVIATION OF ε	2.46***	1.84***	2.82***	2.85***
STANDARD DEVIATION OF η	1.84***	1.78***	1.62***	1.61***
CORRELATIONS				
Childlessness and Union Formation [δ ε]	-0.51***	-0.80***	-0.85***	-0.85***
Childlessness and Out of Education [δ η]	-0.48***	-0.44***	-0.42***	-0.42***
Union Formation and Out of Education [ε η]	0.22***	0.21***	0.16***	0.16***

Significance levels: *** P<0.01, ** P<0.05, * P<0.10